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MINUTES

DICOM WORKING GROUP SEVEN (RADIOTHERAPY)

Meeting Location	Online Meeting	
Dates and Times	Monday, Mar 06, 2023	9:00 – 13:00 EST
	Tuesday, Mar 07, 2023	9:00 – 13:00 EST
	Monday, Mar 13, 2023	9:00 – 13:00 EST
	Tuesday, Mar 14, 2023	9:00 – 13:00 EST
Presiding Officers	Christof Schadt, Co-Chair Jim Percy, Co-Chair	
Secretary	Shayna Knazik, MITA	

Participants

Company/Organization	Represented by	3/6	3/7	3/13	3/14
AAPM	Walter Bosch	X	X	X	X
AAPM	Bruce Curran	X	X	X	X
AAPM	Yulong Yan	X	X	X	X
Accuray	Bob Pekarek	X			X
Advanced Oncotherapy	Ondrej Sevela	X	X		
Brainlab	Christof Schadt	X	X	X	X
Elekta	Jim Percy	X	X	X	X
IBA	David Wikler	X	X	X	X
Mevion	Bruce Rakes	X	X	X	X
MITA/DICOM	Shayna Knazik			X	X
RaySearch	Marcus Bergman	X	X	X	X
RaySearch	Stefan Páll Boman				
RaySearch	Jon Treffert	X	X	X	X
Self	Ulrich Busch	X		X	X
Varian	Kari Jyrkkälä	X		X	X
Limbus AI	Kaley White	X			
Leo Cancer Care	Mike Courtney				X
Cosylab / Leo Cancer Care	Markus Hager				X

Actual Discussion Topics

	Monday	Tuesday	Monday	Tuesday
Session 1 09:00-09:55	Setup, Administrative, Opening General Discussions – New MLC	CPs	Fraction-vs-Session (J. Percy) CBCT Update (Y. Yan) CP-RT224 (U. Busch)	Leo Cancer Care – Chair (M. Courtney)
Session 2 10:00-10:50	General Discussions – New MLC Delivery Number/ Fraction Number in 1st Gen	CPs	CP-RT216 CP-RT227	Assertion Collection Update ISO Document
Session 3 11:10-12:00	General Discussions – Chair vs. Table Discussions- RT ROI Interpreted Type Extension	CPs	Assertion Collection Update	Hybrid RT Plan RT Structure Set
Session 4 12:05-13:00	CPs CT Imaging Sources Synchronize 1st Gen BLD Defs	CPs	Hybrid	Hybrid Next meetings

For details on the topics, see the sections below.

Details

Administrative

- Meeting was called to order at 9:05am EST
- Introductions, identified participants.
- Walter Bosch reminded the group of NEMA anti-trust rules and DICOM Patent Disclosure Policy
- Reviewed the agenda and revised as needed.
- Reviewed meeting minutes from the last meeting

Subgroups and related Group Status

Update reports will be only presented as needed:

- Brachytherapy Subgroup
- Ion Subgroup
- Motion Management Subgroup
- IHE-RO
- IEC
- WG-28
- Other Subgroup reports as needed.

Organizational

The group reviewed action items from the Dec 2022 WG-07 draft minutes

General Discussions

Discussion of a Word template for DICOM Conformance Statement template.

- ACTION: Christof to contact WG-06 regarding a template for DICOM Conformance Statements.

New MLC Definition

Kari found an issue in the New MLC definitions, introduced with CP 2229.

See discussion in Teams.

See also new CP RT226.

In addition, Kari raises the point whether the Enhanced RT Beam Limiting Device Sequence should be relaxed from a 1C to a 2C.

RT ROI Interpreted Type Extension

The DICOM Secretariat received an email on the extension of the list of Defined Terms, see Appendix -; Kaley White joined the discussion.

The basic issue is about missing RT ROI Interpreted Type values (“Implants/hardware (e.g., CIEDs, breast expanders, and clips), spacers, and ITVs are examples”). Although the attribute uses Defined Terms and could thus easily be extended, this will not result in interoperability. On top of that TG-263 has added/will add additional Defined Terms. Should WG-07 also consider these (e.g. in the scope of CP RT216)?.

How is this currently addressed in RT/Brachy applications?

Any need to extend the list of Defined Terms for RT ROI Interpreted Type?

Suggestions for extension of RT ROI Interpreted Type were discussed. A proposal to add the following to RT ROI Interpreted Type Defined Terms is to be added to CP-RT216:

- SPACER – tissue spacer
- COMBINATION – Boolean combination of ROIs

ACTION: Kaley White to draft CP for adding new Defined Terms to RT ROI Interpreted Type.

Combinations of Conceptual Volumes are provided by the RT Segment Annotation IOD. Few, if any, applications implement this capability.

- The chair has 6 DOF in addition to patient posture positioning capability.
- The chair is used for acquisition of CT images (for simulation and verification), as well as for positioning for therapy (using fixed beam).
- Markus presented the workflow for simulation, verification, and delivery.
- The chair itself has fixation adjustments, used for patient setup, that do not change during beam delivery. The chair support has 6 DOF positioning that can be used to move the patient during treatment.
- Patient positioning readouts (armrest, backrest, seat, etc.) are recorded as a Patient Positioning SR. The PPSR is used to store Setup configuration. This configuration may be recorded in CT imaging and treatment records.

Options for representing positioning parameters in treatment plans, treatment records, images, structured reports, etc. were discussed.

Use of the PPSR is a workable method for representing positioning information.

Proposal to continue the discussion of alternatives with IHE-RO TC members.

Table as Fixation Device

Mike Courtney asked for advice how to model a treatment chair in a 1st Gen RT Plan: Completely as a Fixation Device in the Patient Setup Sequence? Or those part which are analogous to a table to be modeled in the Control Point Sequence, but the rest as Fixation Devices?

Adjustments to Backrest, Armrest, Seat are possible. Which of these degrees of freedom is fixed at setup and which ones may change during plan delivery?

What is the Use Case: With whom is the information to be exchanged? What interoperability is needed between systems?

Consensus of WG-07 is to recommend the use of the Patient Setup Module with new Defined Terms for Fixation Device Types to represent configuration of the treatment chair.

[3/14]

Mike Courtney (Leo Cancer Care) and Markus Hager (Cosilab) presented use cases for upright positioning and imaging.

RT Radiation Set Delivery Number and Clinical Fraction Number

Is this 2nd Gen Concept also needed in 1st Gen BDI/Records/…?

ISO/DTR 24290 – Technical Report

Health Informatics – Datasets and data structure for clinical and biological evaluation metrics in radiotherapy

- References to DICOM elements appear vague.
- WG-07 cannot recommend accepting this report.

CPs

See also: WG-07 CP Status List

CPs new to WG-07

cp_RT224 – Synchronize 1st Generation BLD Definitions

Uli Busch presented CP-RT224. This CP updates the description of Enumerated Values in RT BLD Types in 1st Gen Modules referencing Enhanced BLDs and clarifies a reference to changes in Leaf/Jaw Positions. Wording of requirements for the Beam Limiting Device Position Sequence (300A,011A) was revised.

[Meeting adjourned for the day 3/6 at 1:05pm EST. Work on this CP to continue 3/7/23.]

[Resume meeting 3/7 at 9:06am EST.]

Rationale for correction was revised to address multiplicity of Beam Limiting Devices. 1st Gen requirements for the presence of beam parameters in the Control Point Sequence were reviewed and used to revise wording of requirements for BLD Sequence Items. Presence and multiplicity requirements of the BLD Position Sequence in the BLD Macro were reviewed and revised.

Action: Uli Busch to formulate an example illustrating these requirements.

[3/13] Uli reviewed an updated version of the CP with the group.

- This CP includes CP-RT228.
- Wording of the Rationale Section was reviewed and revised.
- An example of dynamic delivery with moving MLC leaves and stationary collimators has been included.
- Conditions for inclusion of the Enhanced RT Beam Limiting Device Sequence (3008,00A1) and Enhanced RT Beam Limiting Opening Sequence (3008,00A2) for Ion Beams were reviewed.

This CP is ready for review with WG-06.

cp_RT225 – Beam-hold Transition Trigger Source

Kari. Jyrkkälä presented a new CP that adds an attribute to identify the source of the trigger of a Beam Hold Transition in the Gating Beam Hold Transition Sequence (300C,0125).The meaning of Beam Hold Originating Device (300C,0128) for a Beam Hold Transition Trigger Source of USER when there are multiple originating devices was discussed.

This CP is ready for review with WG-06.

cp_RT226 – Extend 1st Gen to 2nd Gen Tolerance Value Mapping

New by U. Busch.

The CP extends 1st Gen RT Tolerance Table to cover attributes of Enhanced RT Beam Limiting Device Openings. Some mappings were missing in this table and were added. This CP is ready for review with WG-06.

cp_RT227 – Add reference to Series in UPS Scheduled and Performed Procedure Information Modules

David Wikler discussed a use case for retrieval of Instances referenced in the Input Information Sequence of UPS Scheduled and Performed Information Modules. Currently, these references only specify Instance UIDs, not their Series.

The CP adds a way to reference Series to support Series level retrieval.

- It was noted that the Referenced SOP Instance is currently required. It would need to be made conditional (not present for Series-level references).
- Add DICOM_SERIES Defined Term to Type of Instances (0040,E020)

[3/13] David Wikler reviewed and revised CP with the group.

The CP is ready for review with WG-06.

cp_RT228 – Support of new MLC types for Ions

Bruce Rakes reviewed a new CP that makes changes to the Control Point Sequence of the RT Ion Beams Module and the RT Ion Beams Session Record Module corresponding to changes made for the RT Beams Module and the RT Beams Session Record Module.

- Adds Enhanced RT Beam Limiting Device Definition Flag (3008,00A3), Enhanced RT Beam Limiting Device Sequence (3008,00A1), and Enhanced RT Beam Limiting Opening Sequence (3008,00A2)

Discussion of whether to merge this CP with cp_RT224 since there is some overlap, but also a few differences. Could share tolerance table definitions.

Action: Uli to merge cp_RT224 and cp_RT228 for discussion 3/13

cp_RTxxx – Add Treatment Session as an updateable and trackable number

New by J. Percy.

The concepts of Fraction and Session were discussed. Fractions are prescribed prospectively, but may be delivered in multiple Sessions. Discussion of the need to communicate the (human readable) Session number between a TMS and a TDD.

A distinction was drawn between an “overall session number” and a “fraction session number”.

Action: Jim P. to seek clarification of the use case.

This item was tabled for further discussion in Stockholm. More detailed information is needed.

cp_RTxxx – Update Gantry Angle description on RT IMAGES to allow for an Image beam angle

New by J. Percy.

Clarification is needed to make the treatment beam Gantry Angle (300A,011E) applicable to an image beam angle.

Action: Jim P. to continue work on this CP.

cp_RT185 – Add Patient to Equipment Matrix Examples

Uli Busch reviewed this CP (work in progress) with the group.

This CP provides examples of Image to Equipment Mapping Matrix for the Enhanced RT Image and RT Patient Position Acquisition Instruction. The discussion was tabled (judged to be of lower priority than other hybrid RT work.

Cp_RTxxx – ROI Definition Module

Editorial change only – no change to implementation.

CP was added to the list of work for the hybrid structure set.

CPs in Work

cp_RT214 – 4D Imaging Support

Latest state?

cp_RT216 – Extend RT Structure Set Definitions

Review latest state on context group definitions.

“Anatomic State” was changed to “Physiological State”.

Treatment Site Modifier Code already includes Anatomic Modifier. This is not in conflict with the proposed changes to RT Structure Set.

[3/13] Christof reviewed an updated version of the CP.

- Includes updated codes for Physiological State in RT ROI Context CID using existing DICOM and SNOMED codes.
- Addition of code for “ROI From previous plan” was discussed, but will not be included in the CP.
- Add Contributing Image Series (Type 3). This Sequence also includes Series present in RT Referenced Series Sequence

This CP is ready for review with WG-06.

[Adjourned for the day 3/7 at 12:58pm EST]

[Resumed meeting 3/13 at 9:00am EST]

cp_RT221 – Dose Reference UID vs. Conceptual Volume UID

Review latest wording proposal.

This CP adds Conceptual Volume identification (UID) to Dose Reference in RT Plan.

Discussion regarding multiple Dose References to a Single Conceptual Volume.

This CP was put on hold. Its content may be included in a Supplement later.

cp_RT222 – Strengthen Dose Semantics of Dose References

Review proposal for separation of concerns, based on last discussion.

Main clinical use cases for dose references are (a) Dose reference sequence item is provided for tracking nominal dose in a TMS and (b) Dose reference sequence item is used for QA purposes to compare with measured or recalculated dose.

- Dose Value Purpose
- Dose Value Interpretation

Example use cases for Dose Value Interpretation were discussed.

This CP is ready for review with WG-06.

[Adjourned for the day 3/13 at 12:56pm EDT]

CPs with WG-06

cp2220 – CT Imaging Sources

Yulong Yan reported on a CP to encode an indication of CBCT acquisition using the Scan Options (Type 3) attribute. New Defined Terms are used to indicate a CBCT scan and encode CBCT scan options (beam geometry, beam rotation range). Suggestion to encode as unordered defined terms?

Issues discussed include the following:

I. Limit the scope to RT applications?
II. Include an indication of fan-beams? of pencil-beam scans?
III. Indicate only CBCT?

Bob to consider the need to explicitly indicate fan-beam geometry for MVCT?

Discussion was tabled for consideration in week two of this meeting.

Defined Terms for Scan Options (0018,0022) were discussed and revised (3/13).

This CP is ready for review with WG-06.

cp2222 – Missing Treatment Site Identifier

See comment by Austrian DICOM user group regarding laterality.

CP2157 add Treatment Site Modifier Code to Treatment Site Code Sequence. The Attributes indicates the code is to describe laterality of the treatment site. However, the included CID has more than laterality codes.

It was not clear whether the level of granularity of anatomic codes was appropriate for identifying Treatment Sites. The CP has been put on hold.

Action: Walter Bosch to review CodeX/mCode/RTTD documents for discussion in June.

"Hybrid RT Objects"

RT Plan

Review current state and decide how to proceed.

Setup Beams

For many years, the official communication by WG-07 was that Setup Beams are a concept that should be overcome. The Second Generation RT Objects were specifically designed to handle the workflow task of acquiring setup references outside the treatment plan.

With the hybrid approach, where the DICOM RT Plan will still play a major role, which path do we want to recommend: with Supplement 160 and 213 in place, this goal could still be achieved. But, like with the 2nd Generation RT Radiation Set/Radiations/Radiation Records, is this still an achievable goal, or do we adjust with the "normative power of the factual"?

RT Dose

The Supplement was cleaned. Review current state.

Suggested discussion topics for June 2023 meeting in Stockholm

- Comprehensive description of dose annotation, tracking
- Conceptual volumes
- Generalization of treatment plan geometries
    - Evaluate limitations of RT Plan
    - Adapt 2nd Gen objects/concepts where practical
    - Review: how to address the tomotherapeutic case
- Assess implementation pathways
- Reference to multiple structure sets in RT Plan
- RT Structure Set
    - Logical combinations of ROIs
    - Factoring out ROI definitions
- RT Dose
    - Dose Summation Type – new Defined Term CONTEXT_DEFINED

Supplements

For the status of the Supplements and the corresponding naming conventions and nomenclatures see documents on top level of the Supplement folder on the ftp server:

ftp://medical.nema.org/MEDICAL/Private/Dicom/WORKGRPS/Wg07/Sup/

For a document overview see here:

Project Status

Supplement 238 – Assertion Collection

Brief update on WG-06 discussions. The Supplement has had two readings with WG-06.

Detail review and work during June 2023 meeting in Stockholm.

WG-06 has requested diagrams and examples. (See drawio documents in Teams folder.)

- AC represents the performed state of a workflow. It is intended to be self-contained, I.e., interpretable without reference to other instances.
- The AC defines Reference Collection that can reference Entities at the Study, Series, Instance and sub-Instance level
- Reference Collection State defines assertion. Details, including how to be used in RT, to be worked out in the June 2023 meeting.
- It was noted that the proposed AC has many use cases, both RT-related and non-RT-related. Care must be taken to distinguish the purpose of the AC as “sub-SOP-classes".

Supplement 238 is to be discussed with WG-06.

Future Meeting Dates, Agenda for the Next Meeting and other Administrative Topics

Schedule

The list should be reviewed again, whether any adaptations are required since the last meeting.

Teams Meeting List

Cadence of Future Meetings

- It was noted that a large fraction of WG-07 bandwidth has been consumed with CPs.
- Having two F2F meetings per year to do substantial development work was discussed. This may not be practical in view of travel budgets.
- Christof will work on a proposal for discussion in Stockholm.

Appendix: General Information

- ## Project List

The list of major projects pursued by WG-07 can be found here.

- ## Presentation Material for 2nd Generation RT Objects

A folder is maintained containing material of presentations on 2nd Generation topics.

Everyone is invited to use any material out of that folder for presentations.

In turn everyone should to add his presentations to this folder, if they could be of general use. As needed, take care to remove any company- or institution-confidential parts before posting.

ftp://medical.nema.org/MEDICAL/Private/Dicom/WORKGRPS/Wg07/2ndGeneration/Presentations

- **E-Mail on RT ROI Interpreted Type Extensions**

Your Name	Kaley White
Your Email	
Your Message	To whom it may concern: I would like to submit a suggestion for a future edition of the DICOM Standard. For context, I work as a software support engineer at a company that makes radiation oncology autocontouring software. It is essential for our product to play well with other radiation oncology software, especially treatment planning systems (TPS). Well, the DICOM Defined Terms for RT ROI Interpreted Type (3006,00A4) (section C.8.8.8) are not comprehensive for radiation oncology. Implants/hardware (e.g., CIEDs, breast expanders, and clips), spacers, and ITVs are examples of ROIs that don't match any of the Defined Terms. Most radiation oncology professionals use the ORGAN Type for most of these ROIs, but this is inaccurate, and different TPSs handle this problem differently, making it difficult for us to match our software's contour RT ROI Interpreted Type to the user's TPS's. My colleagues and I agree that additional RT ROI Interpreted Type Defined Terms are in order, such as IMPLANT or SPACER. It is interesting that such terms do not exist, given the several brachytherapy-specific Defined Terms. You may be familiar with TG-263 (https://www.aapm.org/pubs/reports/rpt_263_supplemental/), an AAPM official guidelines report on nomenclature in radiation oncology. TG-263 attempted to work its standard around DICOM Defined Terms but noted several shortcomings similar to what I note above. (See section 5.3 of TG-263.) Based on the TG-263 report and supplemental spreadsheet of suggested structure names, the Defined Terms DEVICE, DERIVED, and possibly PRV could also be useful. An update to TG-263 is in progress that will address more non-anatomical structures and could be informative for other RT ROI Interpreted Type Defined Terms. I'm happy to provide more details if necessary. Thank you for your time. Kaley
Privacy Policy	true

Prepared by Walter Bosch
Submitted by Shayna Knazik
Reviewed by Counsel 6/8/2023